



Australian Bureau of Statistics

CensusAtSchool Australia

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Resources



CaSMa11 - Environmental Graphs

You can download this activity, the teacher solutions and the [assessment rubric](#) as a rich text file (RTF) at the bottom of the page. Download our printer friendly Prepared Samples as Excel files or access data using the Random Sampler.

Subject Area

Mathematics

Key Statistical Literacy Competencies Addressed

- Data awareness
- The ability to understand statistical concepts
- The ability to analyse, interpret and evaluate statistical information
- Communicating statistical information and understandings

Overview

This lesson introduces the concept of deviation from the mean. Students compare the environmental issues summary data for each state. They use each State and Territories Environmental mean to calculate how issues in each state deviate from this mean.

Requirements

- Calculator
- Student Worksheet

Instructions

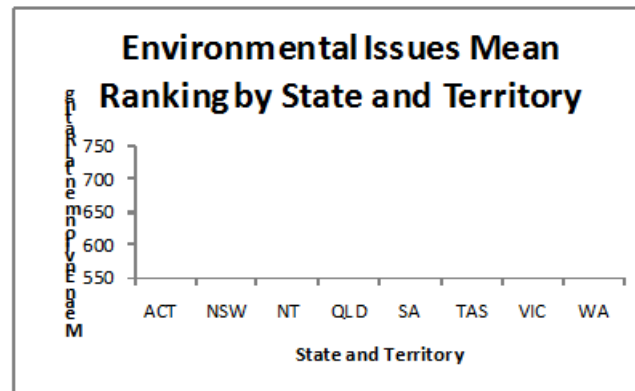
Environmental Graphs

CensusAtSchool Environmental Opinion Results for States and Territories

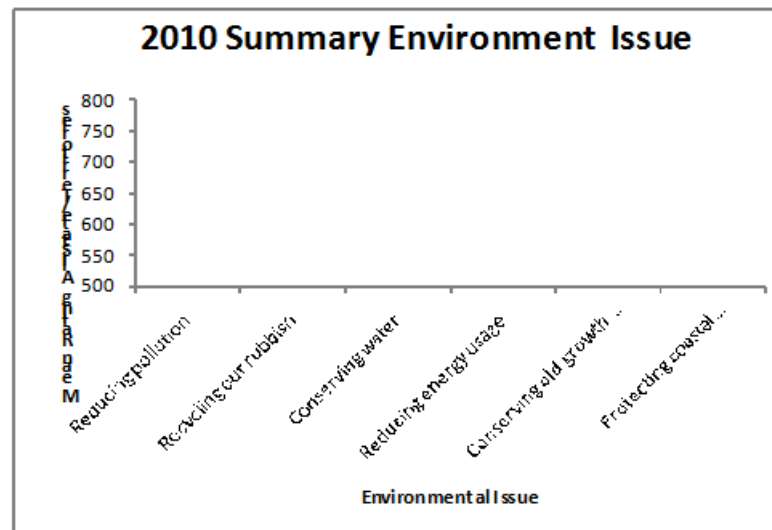
The summary statistics for the 2010 CensusAtSchool questionnaire showed the following results on the importance for six Environmental Opinion Issues, where a rating of 0 represented Not Important and 999 represented Very Important:

Issue	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Issue overall mean
Reducing pollution	713.4	694.6	679.2	652.6	655.2	621.7	680.3	685.9	
Recycling our rubbish	721.2	685.8	641.2	628.3	638.0	615.4	673.9	651.3	
Conserving water	768.4	722.2	672.6	690.0	723.3	625.1	752.1	712.0	
Reducing energy usage	681.3	647.8	623.6	615.5	597.5	563.6	635.5	630.5	
Conserving old growth forests	635.2	585.2	616.5	580.0	552.8	558.3	568.3	587.8	
Protecting coastal/marine environments	702.7	672.9	672.8	668.2	632.5	635.3	646.5	667.1	
State/Territory Overall mean									

1. In the last row calculate the overall State and Territory mean to one decimal place.
2. Use the overall State and Territory mean to make a column graph on the axes below.



3. Comment on the results
4. In the last column of the table calculate the overall issues mean to one decimal place.
5. Use the axes below to make an overall Environmental Issues mean column graph.



6. Comment on the results

The Mean as a measure of the Centre of Data

As the mean is one measure of the centre of data you can check that your results look reasonable by counting the number of values above and below each mean. They should be roughly even.

7. Fill in the table below to show how the ratings varied from the State/Territory overall mean.

State/ Territory	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
No. above the mean								
No. below the mean								

8. Were the results even for all States and Territories? If not, can you suggest a reason?

For example, the Queensland mean environmental rating is 639; there are three issues that scored higher than this and three that scored lower.

The Deviation from the Mean

If the mean is the centre of the spread then how far each value is from the mean gives an indication of how each variable is perceived. This difference from the mean is known as the deviation from the mean. A positive deviation means that a value was ranked above the mean while a negative value means that it was ranked below the mean. The deviation from the mean is calculated by subtracting the mean from the value. This is written mathematically as

$$\text{'deviation from the mean'} = x - \bar{x}$$

where x is the score or value and $\bar{x}$ (called x bar) is the mean.

E.g. 1 In Victoria, for conserving water: deviation = $752 - 659 = 93$

This means that conserving water is quite a bit higher in ranking than the overall mean.

E.g. 2 In Queensland, for conserving old growth forests:

$$\text{deviation} = 580 - 639 = -59$$

This means that conserving old growth forests is lower in ranking than the overall mean.

The graphs on the next two pages use each deviation from the mean to show the importance that students from each State and Territory placed on the six Environmental issues.

9. Use the graphs and the table above if necessary to answer true or false to the questions below. Where you answer false, give the correct response.

	STATEMENT	TRUE	FALSE
A	NSW and Tasmania were the only States/Territories where four issues rated above the mean and two below.		
B	Conserving water scored the highest positive deviation in each State and Territory		
C	Conserving old growth forests had the highest negative deviation from the mean in all States and Territories.		

D	Conserving water in Victoria had a higher deviation from the mean than in SA.		
E	In all States and Territories reducing pollution ranked more highly than recycling our rubbish		
F	Recycling our rubbish had a positive deviation in all States and Territories.		
G	Reducing energy and protecting old growth forests had a negative deviation in all States and Territories		
H	To say that an issue had a negative deviation is the same as saying it was ranked below the overall mean.		
I	Reducing energy ranked highly in all States and Territories		
J	Responses in NT were clustered closest to the mean compared to the other States and Territories		

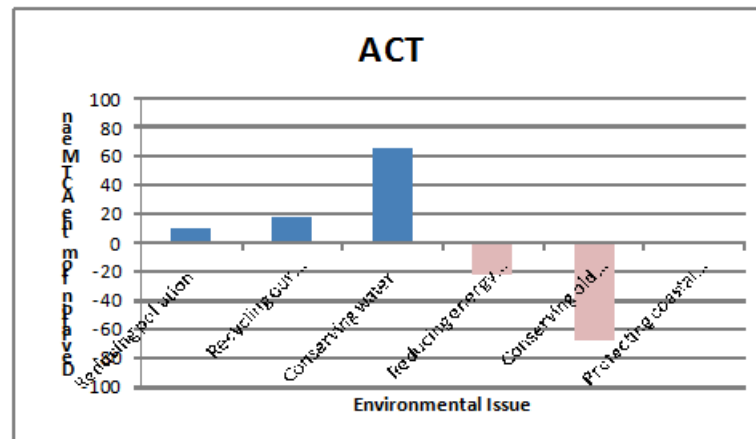
10. You should have found 4 FALSE statements. Correct them by writing a TRUE statement below.

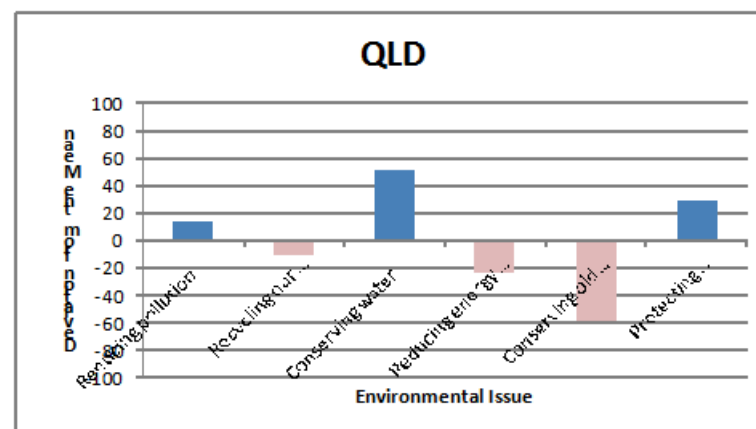
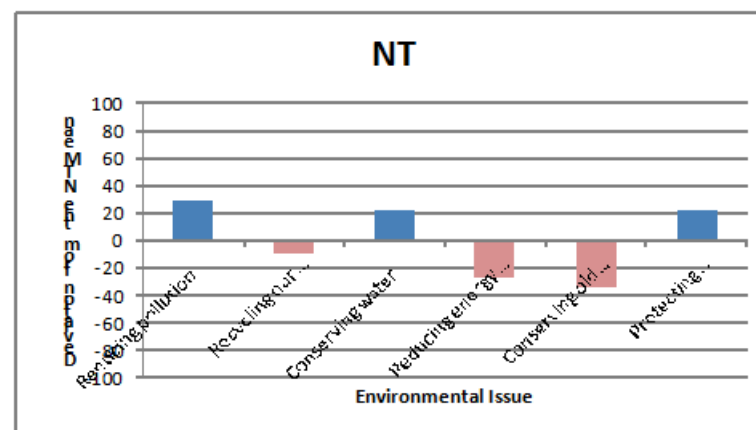
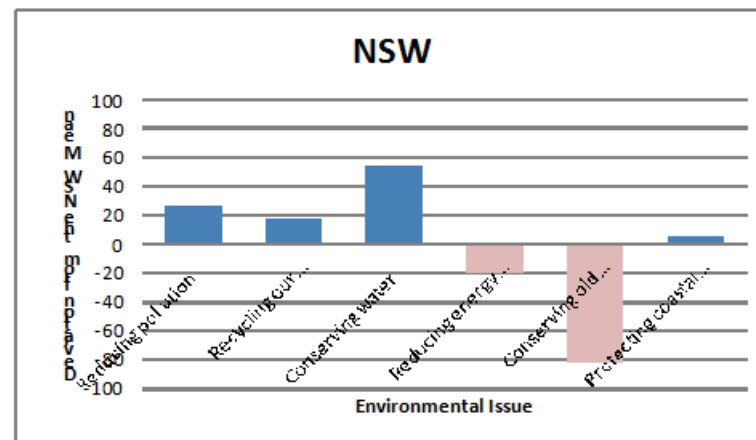
(i)

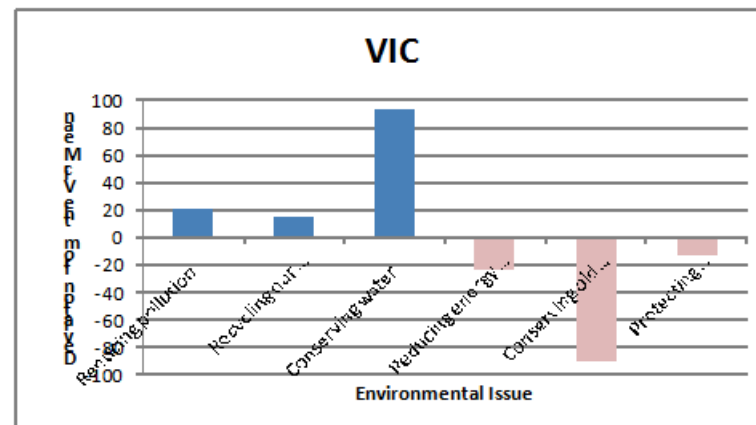
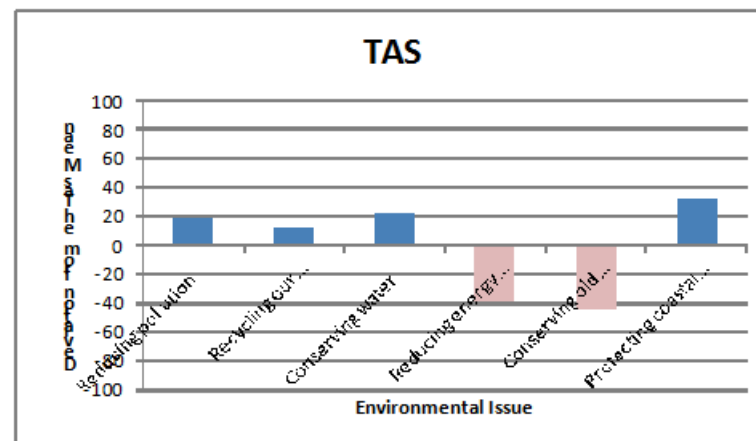
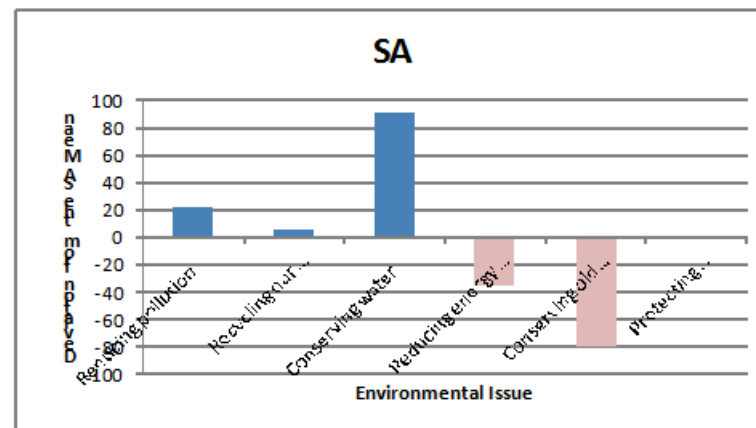
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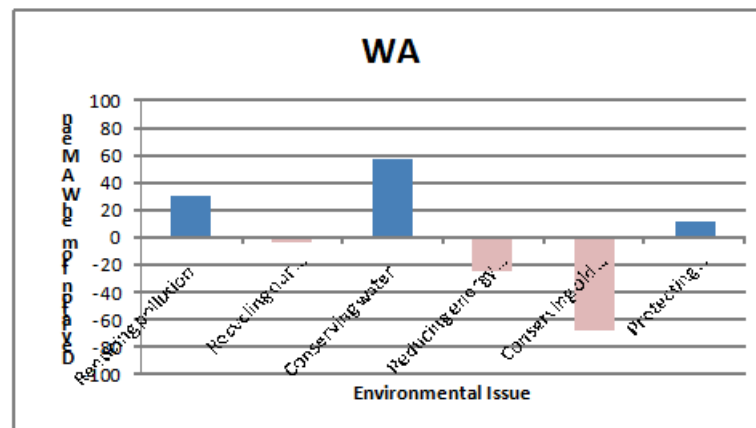
(iii)

(iv)









Download the Activity

Student Worksheet

RTF

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Assessment Rubric

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